

# CANADIAN ARCHITECT AND BUILDER.

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## —THE— CANADIAN ARCHITECT AND BUILDER,

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(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),

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Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

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THERE has just been published by the direction of the General Assembly of the Presbyterian Church in Canada, a pamphlet of nearly forty pages containing illustrations accompanied by brief descriptions of designs suitable for country, village and town churches. Most of the designs are reproductions of drawings submitted in the recent Presbyterian church competition. Although they cannot all be declared to be satisfactory examples of church design, the excellence of some is such as to encourage the hope that they will in a measure serve the object the church had in view in their publication, viz., improvement in the design of rural churches. The authorities of the Presbyterian church deserve commendation for the attempt they have made to improve our church architecture. It is to be hoped the result of their first modest effort will prove so satisfactory that at some future time they will feel encouraged to carry their purpose a step farther.

THE ingenuity of the impecunious and dishonest contractor is truly wonderful, and when aided by that of an unscrupulous lawyer, is well nigh certain to succeed in defrauding persons unaccustomed to doing business in other than a straightforward manner. A contractor and lawyer of this description have been practising of late in Toronto, and have succeeded in defrauding a number of supply firms and sub-contractors. The lawyer writes a letter stating that the contractor is about to secure through him a loan, and that he will control its distribution. The impression is conveyed that the lawyer will assume responsibility for the payment out of the loan of claims for material and labor required by the contractor in the carrying out of his contract. The letter is, however, so skilfully worded that while it has in several instances obtained for the contractor the material and help he required, the supply firms and sub-contractors who subsequently brought suit against the lawyer were unable to recover their claims. It is hoped that this *expose* may assist in putting a check on such crooked practices.

THE difficulty of securing the title to the land required for the proposed union railroad depot at Toronto, which has been the means of delaying for nearly a year construction on the building, at last appears to have been overcome, and the work is to be proceeded with at once. In the present inactive condition of building enterprise it is satisfactory to learn that this important undertaking, which will absorb both labor and material to a considerable extent, is to go forward during the present season. In this connection we must express our regret that apparently no advantage is to be taken of the favorable circumstances at present existing for permanently improving the appearance of the water front. The shabby old wooden structures which occupied a portion of the site required for the new depot, instead of being torn down and forever banished from sight, have been permitted to be removed out to the line of the new street which it is proposed to construct as a promenade at the water side. The city authorities should determine to get rid of these and as many as possible of the other old buildings which for years have disfigured the city front and falsely impressed strangers visiting it for the first time by boat or train. Has the idea of a small park on the water front been abandoned? We trust not. The opportunity now exists for establishing such a park or garden, which would do much to make the city front attractive and afford a pleasant resting place for persons having to wait for boats or trains, as well as those who would wish occasionally to enjoy a half hour beside the water without being obliged to spend effort, time and money to go across to island park.

WITH many others we indulged the hope that the disgraceful revelations brought to light a couple of years ago of bribery and fraud on the part of government officials and contractors for public works, would suffice to purify the methods of these classes of persons in the future. Unfortunately in this hope we have been disappointed by the evidence which has lately been given before the Commission appointed by the Government to investigate the expenditures and circumstances connected with the erection of the new railway bridge across the Lachine canal at Montreal. The investigation was ordered when the fact became known that the estimated cost of the work,



which was \$250,000, had been exceeded by \$200,000. The investigation has shown that the work was not let by contract, but was done by day labor under the supervision of government officials. It would be instructive to learn why the usual custom of letting such work by contract was departed from in this instance, and under whose authority the departure was made. It is also pertinent to enquire why, having decided to do the work by day labor, the government superintendent did not hire direct the mechanics, laborers and teams required, instead of making a contract with a third party to supply them at prices which enabled him to pocket a substantial commission on the transaction. The thing has the appearance of having been worked in this way for the deliberate purpose of enriching certain individuals at the expense of the government and the country. The evidence given before the investigating Commission strongly supports this view. The testimony is that double the number of men, horses, and in some cases material, were provided and paid for than were required, that the prices paid for both work and material were largely in excess of the market value, and that material was paid for by the government which was diverted to the use of private individuals connected with the work. In short, as we have said, there appears to have been an organized and successful effort on the part of everybody to rob the government, as was illustrated by the remark of a laborer who, when some one suggested that less men were required to do the work, replied "Mind your own business—we're working for the government." It is to be hoped that a severe example will be made of persons who may be proved guilty of having conspired to squander the public funds for their own benefit and that of their friends. The bloodthirsty propensity which seems to have obtained such deep root must, if possible, be stamped out.

LEAD water pipes that are used on streets occupied by electric railways who use the rail for a ground and return, are found in various places to be seriously affected by the eating away of the outside of the pipe by electrolytic action. In the city of Hamilton the water department have been compelled to renew the service pipes in quite a few places, the worst affected seeming to be in close proximity to the power house. It would perhaps be quite a difficult matter to advance a proper theory for this result. It is perhaps caused by the pipe being laid in a particularly dry sandy soil, and by the return current in its effort to reach a good ground finding such ground by way of these lead pipes to the water mains in preference to forcing its way to a wet spot in the ground through dry sand or perhaps rock. That it should occur in the immediate vicinity of the power house is more difficult to account for, unless it be that the rail connections on the ground plate at that end offer a greater resistance to the passing of the current than does the intervening earth between the rails and these numerous water service pipes. In the case of Hamilton the water mains are several feet higher than the level of the bay and the streets all dip at a great angle to the bay, forming thereby a water shed that must result in a somewhat dry sub-soil. That the pipes are eaten away as the result of the current going to ground through them there can be no doubt, and that this action is purely an oxidization of the metal through the electrolytic action is reasonably certain. To remedy the trouble we think will be quite a difficult matter, but as experiments in that direction will no doubt be the order of the day, we would suggest the following as worthy of consideration and trial: Wrap the pipe with a covering of tarred (pine tar) hemp about half an inch thick before burying it; give the outside of the pipe a thick coat (or two or three coats) of a good, hard, but elastic japan, which has been well dried in an oven; let the outside of the pipe be enamelled with an elastic enamel the same as is now being used on the inside of some lead water pipes; surround the pipe by a square box some three or four inches in internal diameter, thereby allowing an air space as an insulator; last but not least, see that the rails are well grounded, bearing in mind the fact that a hole dug some six or seven feet in the ground and a large piece of an oil boiler stuck in with a number 4 galvanized iron connection to the rail is simply no ground at all in a sandy soil, and would not be much better in a pool of water. For the carrying of heavy currents such as are used in street railway work, a good ground should consist of at least 100 square feet of exposed metallic surface, preferably copper, covered on its two sides with at least one foot in thickness of fine gas coke and buried in decidedly moist earth, and connected to each rail by a No. 0000 copper wire well rivetted and sweated on. With such a ground every quarter of a mile, and good and sufficient bonds between the rails we predict that the eating away of lead water pipes would soon be a thing of the past.

#### CANADIAN PRESSED BRICK IN THE UNITED STATES.

A CANADIAN manufacturer of pressed brick informs us that he has an order from Buffalo for 200,000 bricks, and that other Canadian firms in the same line are shipping quite extensively to eastern American cities. When asked what gives rise to the preference for Canadian brick, he replied that it is mainly their superiority and uniformity of color. "We are able," he said, "to manufacture two hundred thousand bricks in which exactly the same shade of color will be maintained. The American manufacturers, owing I presume to the nature of the ma-

terial at their disposal, do not appear to be able to succeed thus in securing uniformity of tone. Hence we find Americans who, in order to secure superior results, are willing to pay the duty on Canadian bricks."

#### ILLUSTRATIONS.

COMPETITIVE DESIGN FOR PROPOSED NEW GOVERNMENT BUILDINGS AT VICTORIA, B. C.—MESSRS. DICK & WICKSON, ARCHITECTS, TORONTO.

BANK OF HAMILTON, WINGHAM, ONT.—MR. D. B. DICK, ARCHITECT, TORONTO.

#### MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

Sir William Dawson, who for nearly forty years has discharged with distinguished ability the duties of President of McGill University, has retired. The weight of advancing years demanded that he should lay down the activities associated with the position. Sir William Dawson has commanded world-wide recognition as a scientist and educator, and has had conferred upon him many marks of distinction by learned societies, including the presidency of both the British and American Associations for the Advancement of Science. His successor to the Presidency of McGill has not yet been chosen.

There is a desire expressed by some of the aldermen that the city should discard the contract system and carry out municipal works by day labor under the supervision of the city surveyor and his assistants. By this means they hope to save the contractor's profits. In theory the thing seems easy of accomplishment, but it has worked out differently in practice in more than one city where it has been tried. It opens the door to jobbery, and for some reason or other the work costs more than when done by contract. Workmen in the employ of the city apparently do not feel called upon to put forth their best efforts.

It is reported that a large hotel is to be erected at the corner of Peel and St. Catherine streets, on the site of Erskine church, and that Mr. Townsend, architect, of New York, has been employed to prepare the plans. Dr. Dugald Graham's name is mentioned as being one of the leading projectors of the enterprise.

The formal opening of the new Board of Trade building has been postponed until September. The occasion promises to be one of much interest.

The Dominion Bridge Company has re-elected the following officers: Mr. James Ross, president; Mr. James P. Dawes, vice-president; Messrs. R. B. Angus, Duncan McIntyre, T. G. Holt, James Cooper and P. Donaldson, directors.

On the 13th of June there was sold at the Fraser Hall, a most interesting and valuable collection of antiquities and objects of art, the property of Mr. E. Colonna, architect, of this city.

About twenty-five models have been submitted in the competition for a memorial statue to the late Sir John A. Macdonald. These models have been open to inspection by the subscribers to the fund, prior to a choice being made by the Committee.

Owing to delay in completing the new additions, the formal opening of the art gallery will not take place until the autumn.

#### WINNIPEG.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

Mr. Geo. Browne, architect, of this city, has designed a new building to be erected for the congregation of Westminster church at the corner of Notre Dame and Charlotte streets. The structure will cost about \$25,000, and will be constructed of white brick with Selkirk stone trimmings. The seating capacity will be upwards of 900. The auditorium is 65 feet square, with inclined floor and seats arranged in semi-circular form. There will be towers at three corners of the building and an octagonal bay on Notre Dame street.

Tenders have been invited for the erection of a new church for the congregation of St. Paul's, at Regina, to cost \$20,000.

Mr. Hugh McGowan, architect, this city, has designed and commenced the erection of a new school building at Greta, Man.

The corner stone of a new Methodist church at Boissevain, was laid with appropriate ceremony June 19th.

Tenders have been received by the Minister of Public Works for the heating of the new Court House building.

The Salvation Army is preparing to erect a building to serve as headquarters in this city.

A large number of small residences, ranging in cost from \$500 to \$2,000 are being erected here this season.

The Mason Contractors' Association and the Carpenters and Builders' Association, of this city, have recently amalgamated under the name of the Builders' Association of the city of Winnipeg. The move is without doubt a good one.

It is estimated that the total expenditure on buildings in this city during the present year will exceed that of 1892 by three quarters of a million dollars.

#### LONDON.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

In London this season there is an immense amount of building to be done, but so few good builders that they are busily employed, and tenders for new work are fully 30 per cent. higher than ordinarily. The result is already apparent, there are numerous prospective new residences which have already been dropped on account of the great cost, and others are sure to follow, especially if the fact of the change becomes generally known. I think it advisable to make these facts known in the hope that possibly some good brickworkers and carpenters in Toronto may be encouraged to figure on work here. If, as I am given to understand, building is not brisk in Toronto, there must be many contractors to whom the information would be beneficial. If building continues to be abandoned here for the reasons given above, contractors here will lose, and can afford to welcome outsiders. Recently two or three prominent firms here have given up business, so that there seems to be an unusually good opening for some one competent to manage a builder's business. The cause of giving up was death in both cases.



### THE LATE JOHN A. WILLS.

It becomes our painful duty to chronicle the unexpected death on the 16th of June, of Mr. John A. Wills, Chief Engineer at the Toronto Custom House, and Chairman of the Board of Management of the Toronto Technical School. Mr. Wills, who was in his 48th year, was possessed of a naturally strong physical organization, and until the last two years enjoyed the best of health. Of late he was a sufferer from Bright's disease, and early last spring passed through a severe illness which several times threatened to have a fatal ending. Greatly to the comfort of his family and many friends, what seemed to be a marked improvement in his condition manifested itself a few weeks ago; he gained strength rapidly and was able to go down town. But a few hours previous to his death he drove around town with a friend who was on a visit to Toronto. After returning from the drive he lay down to sleep—which proved to be the sleep of death—for he passed quietly away a few hours later without having regained consciousness.

The deceased was a native of Ottawa, in which locality his parents were among the first settlers. After graduating from college, he entered as an apprentice the machine shops of Messrs. E. & C. E. Gilbert, at Montreal, who at that time were the principal manufacturers in Canada of marine engines. On completing his apprenticeship he went to the New England States, where he spent several years.

On his return to Canada he received the appointment of Chief Engineer of the Dominion Parliament Buildings, which position he held for three or four years, when at his own request he was transferred to Toronto and assumed the duties of the position which he occupied at the time of his death and for seventeen years previously. He took an active interest in the subject of technical education, and upon the organization of the Toronto Technical School was elected to the Board of Management and at the commencement of the present year was called to preside.

His cheerful, sympathetic disposition made for him a multitude of friends, to whom his sudden death is the subject of profound regret.

### TORONTO BUILDERS' EXCHANGE.

THE second annual excursion and picnic under the auspices of the Exchange, took place at Wilson Park, N. Y., on Wednesday, the 28th of June. The new and comfortable steamer, "Garden City," carried the pleasure seekers across the lake in less than three hours, and the water being smooth the time spent on the water was greatly enjoyed by all.

About two hundred members and friends of the Exchange participated in the outing. Business engagements prevented the attendance of some, while the threatening aspect of the weather in the early part of the day and the nearness of Dominion Day militated against a larger attendance.

On the whole, however, the Exchange are to be congratulated on the success and enjoyment which marked the occasion, and which it is hoped will encourage them to maintain the annual excursion and picnic during many future years.

The steamer made two trips, leaving Toronto at 8 a.m. and 2 p.m. Fortunately the sky which in the morning was overcast with heavy clouds, gradually cleared as the sun's bright rays forced their way through and smiled graciously down upon the pleasure-seekers.

The voyage was much shortened and its enjoyment enhanced by the humorous character impersonations of Prof. Stuart and the charming music discoursed by Burton's orchestra. These also entertained the company in the pavilion after the arrival at the park, as well as on the return trip.

One of the principal events of the day was the baseball match, the rival teams representing respectively the builders and supply men. The builders' nine, which was captained by Mr. T. Cannon, was composed as follows: Messrs. T. Cannon, Benjamin Brick, Harry Martin, John Hanrahan, Eli Wickett, Jas. Crang, jr., E. B. Axworthy, Jethro Crang, Wm. Rowe.

The supply men were captained by Mr. John Maloney, their nine being composed of Messrs. Maloney, W. Whillans, B. McKenny, R. Elliot, W. Dickey, B. Anderson, L. Robertson, — Mowat, W. Hollyman.

It was agreed that the playing should last for two hours. At the end of that period the supply men had scored 24 runs, while the builders had gained but 12. The game was a most interesting one and the playing on both sides very creditable, notwithstanding that the score from a professional standpoint might be regarded as a trifle large.

An interesting program of sports was also provided for the children, with suitable prizes for the winners. These special features and the excellent boating facilities served to pleasantly

pass the time at the company's disposal. The only regret which we heard expressed was that, in view of the fishing possibilities, Mr. David Williams should have neglected to take with him a hook and line. It was a case of "what things one sees when he hasn't a gun."

The thanks of all who participated in this pleasant outing are due to the following gentlemen who composed the Committee of Management: Messrs. Thos. Cannon, chairman; David Williams, treasurer; John Phillips, secretary; John Maloney, Benjamin Brick, Harry Martin, M. Murphy, W. Williams, Joseph Brown, John Barnard and John Aldridge.

### CANADIAN ASSOCIATION OF BUILDERS.

At a recent meeting of the Exchange, the subject of endeavoring to bring about the organization of a provincial or Dominion Association of Master Builders was discussed. While it was felt that the present, perhaps, owing to the prevailing depression, might not be the most favorable time to attempt the organization of such an Association, yet it was thought that the idea might to some extent be worked up. The Secretary was accordingly instructed to communicate with the Secretaries of the Builders' Exchanges in Hamilton, London, St. Thomas and Ottawa for the purpose of getting an expression of opinion on the subject. The advantages of such an organization have more than once been referred to in these columns, and we hope in the near future to see the proposal assume tangible form.

### LEGAL DECISIONS.

AN ARCHITECT AND DEFECTIVE DRAINS.—We learn from the *British Architect* that in the Queen's Bench Division the other day, before Justices Mathew and Wright, the case of *Levenberg v. Wykes* came on for hearing. It was an appeal by the defendant, an architect, from the judgment of the County Court Judge at Birmingham after the finding of a jury. The defendant was architect of some houses built in Portland Road, Edgbaston, in 1878, and plaintiff's case was in that year, when there was a nuisance on the premises and the drains were opened, it was found that they had not been constructed in accordance with the plans deposited with the local authority. An action was therefore brought against the defendant for fraudulently representing that they had been so constructed, and the jury found a verdict for the plaintiff. Mr. Hugo Young, for defendant, now contended that there was no evidence on which the jury could so find, that defendant had no representation as to the drains, and that he had altered them in the exercise of his discretion under the contract. Mr. Turrell, for the respondent, urged that the verdict of the jury must stand, as there was ample evidence on which they could find as they had done. Mr. Justice Mathew, in giving judgment, said the sole question for the Court was whether

there was evidence in the case on which the jury could reasonably find as they had done. He was satisfied that there was that evidence, and he was also satisfied that the learned judge, in his summing up, told the jury the law with great clearness. In fact, he represented the case in such a way that the jury, if they were disposed to take a favourable view of the defendant's conduct, had an opportunity of doing so, but they considered that the plaintiff had made out his case, and so found. The appeal would be dismissed with costs. Mr. Justice Wright concurred.

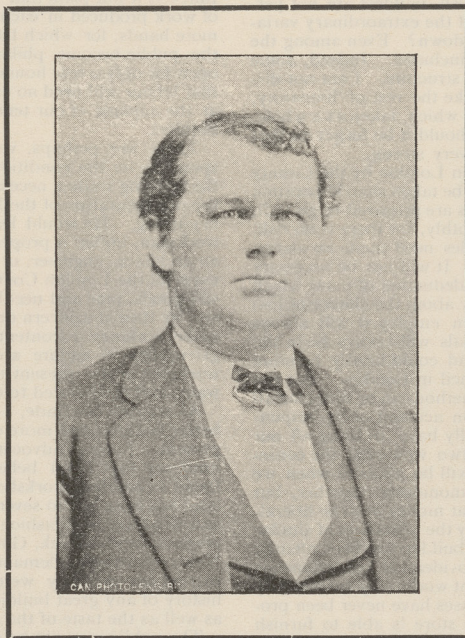
### QUESTIONS AND ANSWERS.

[Readers are invited to ask through this department for any information which they may require on lines consistent with the objects of the paper. Every effort will be made to furnish satisfactory answers to all such inquiries. Readers are requested to supply information which would assist us in our replies. The names and addresses of correspondents must accompany their communications, but not necessarily for publication.]

C. H. W., Peterboro', writes: Can you inform me where I may obtain the best slate for blackboards? I have tested several kinds of composition offered as a substitute for slate for this purpose, but they are to my mind not satisfactory. I have examined the advertisement pages of the *CANADIAN ARCHITECT AND BUILDER*, without finding the name of any dealer in slate for this purpose.

ANS.—We understand that at Rockland, Que., slate is to be found which is well adapted for blackboards, and that a new company has recently purchased and undertaken to develop these quarries.

Charles E. Thibault and Joseph Perrault, have been registered to carry on business in Montreal as plumbers under the firm name of Thibault & Perrault.



THE LATE JOHN A. WILLS,  
Chairman of the Toronto Technical School Board.



## FUNCTIONS OF THE BUILDER.\*

THERE are apparently changes impending which may modify, if they do not transform, the office of the builder. On all sides we find people who are eager to introduce new arrangements. The system by which Great Britain is covered with buildings that are sound, commodious, and economical is, in the opinion of amateurs, out of joint, and wants mending. Hence it is we find good-natured people are eager to benefit the world by substituting for our experience the undisciplined boldness of outsiders.

This spirit reveals itself not only in the dreams of imaginative gentlemen who would desire to see the architect leading a body of craftsmen, while in some way he shares in their toil. It is seen, too, in the desire to have architects whose diplomas are evidence that they have mastered all the mysteries of construction, and are able to take our places. It inspires also the proposals of public bodies to dispense with builders. It gives point to the articles which the journals print whenever an accident occurs. The support which is given to strikes depends on the belief that we are in some way in the wrong. It is a curious fact, as exemplifying this tendency of the present that the member who was charged with the introduction of the last Registration Bill in Parliament imagined it was intended to apply to builders as well as to architects.

It is not in England alone that there is a wish to disturb arrangements which exist, because they are found to be in correspondence with the needs of the public. I have been told that a few weeks ago in Paris the Chief Administrator of the Department of Public Works declared in public that it was wrong to have a division between architects, engineers, contractors, and workmen, and that all their duties could well be fulfilled by one individual. In England we often hear similar propositions about rolling four single gentlemen into one, but in France the State out of the taxes creates both architects and engineers. Such amalgamation as was suggested on that occasion is equivalent to saying that the Government have been acting wrongly, and that public funds are misapplied. Yet such is the courage of the advocates of change, they will incur any sort of risk if it helps to advance their hobby.

I am not concerned with a defence of the French system of executing works. But I would ask, what evidence is there that English builders are not performing their work most satisfactorily? In spite of the extraordinary variations of our climate, how many buildings are cast down? Even among the defects of jerry-building want of stability is not included. Indeed, some artists lament the enduring powers of that class of structure. I am not disposed to maintain that builders are not fallible like the rest of humanity, but I do say that there is no business in the country which, taken as a whole, is conducted more honestly than our own. Nor should it be forgotten that in many cases the temptations to the contrary are very strong.

The proposals to erect dwellings and buildings in London by the County Council without the intervention of a contractor may be taken as an illustration of the lengths to which reformers or rather theorists are prepared to go. In an experiment of that kind everything works smoothly, for there is no risk. The defects in foundations or other natural obstacles need excite no alarm, for the cost of dealing with them is provided for. It will not be necessary to be alarmed about extra works or grieve over the deduction of items which were expected to be profitable. There is no anxiety about the chance of loss or any other contingency of the kind. The men employed will always be in good humour, and those who supply materials will always be in the most accommodating mood. Building in fairyland could hardly be more of a pastime than it will be under the County Council in London. But can you imagine, gentlemen, that so happy-go-lucky a method can be economical? We who have to suffer mental distress every day on account of the responsibility which we have assumed and who occasionally have to bring all our courage to bear in order to face our risks, know too well what the consequence will be. No doubt a very pleasant sight will be afforded when we find all who co-operate in a building working harmoniously together, but like all spectacles which are novel it will be found that money must be liberally expended on the arrangements. It will be said by the advocates of similar schemes that on private works in many places the builder has been already superseded. Drapers, co-operate stores, and providers of miscellaneous things are credited with having carried out important works very successfully at a fraction of the legitimate charges. All those cases have never been properly scrutinized. If, for example, a co-operative store is able to furnish gasfittings at one-fifth the price which experts had estimated, is it not plain that the profit and loss account of the gaslighting department of the store was never properly made out? In all such cases a great number of departments have to be taken together and the loss in one of them is compensated by the gain in another. Then, again, when we hear that a draper has offered to do certain work in stone or iron far below cost price, we may always expect to find that he is to be allowed to supply goods that are within his province. For what he loses in construction he is able to refund himself by what he gains in furnishing. It would be easy to explain many other inconsistencies, but I need not waste your time about them. The public may rest assured that in building works, no matter what agency they may employ, they will not gain more than if they had trusted themselves to a respectable and established builder.

We have no opportunities of performing such tricks of legerdemain. If by an oversight we under-estimate the cost of work we have to bear the penalty. We have no means of finding compensation. We have no prospect of receiving payment for work which was not executed. In fact, I consider that if the advocates of revolutionary changes were aware of the liabilities of builders to incur loss, they would be somewhat less bold in bringing forward their schemes.

They are to be excused, however, for workmen who sometimes have been closely connected with us for many years appear to have a notion that all contracts are profitable. In no other way can I explain the tendency to strikes which has prevailed of late. Any cause seems to be sufficient to stop works. I will give the English workman the credit of being very honest. If he had not assured himself that there was more than sufficient profit in every case to meet his demand, he would hesitate before he created so much confusion. Of late years his demands have taken two forms—an increase of wages and a reduction of working. To discuss on what principles wages should be determined would take me too far on the present occasion. It is a vast subject, and one which has many sides. But I think I may say that the workmen of any district (Cardiff among others) would find in our association as reasonable advisers in their difficulties as they could select. The Council of the Association are bound to take a broad view of the organization of which workmen form an important part, and they are not likely to under-value anything which would cause business to be stopped for a day if in an honorable way they could devise a remedy. I am sure that I am only expressing your minds when I say we have the fullest sympathy with our workmen. This is seen by the endeavours which are made to keep them with us. We are all proud of having workmen who have continued with us since their apprenticeship, and I have no hesitation in saying, incredulous as it may appear to skeptics, that one of the causes which lead so many of us

into unprofitable contracts is the desire to retain an unbroken staff around us.

As regards working hours the question must be judged from another point of view. No doubt, gentlemen, your experience has been the same as my own, which is that in no department of life, outside the Government service, a man has not been able to advance himself who has been satisfied with working eight hours a day. All professional men must undergo greater toil unless they wish to remain at a low level. I am afraid our own business would hardly be profitable any day if we were satisfied with giving only eight hours attention to it. I see no reason, in spite of all my regard for the working classes, why they should have a much easier life than our own. As a rule, they have not only to work fewer hours, but they are free from responsibilities and other harassing sorts of wear and tear, which we must endure.

Some of you remember in your youth to have seen statements or tables which were prepared by Peter Nicholson, who once upon a time was accepted as an authority. He called them "Constants of Labour," and they were intended to show how much time was to be occupied with the most insignificant details of builders' work. I have never used Nicholson's "Constants," nor met a builder who employed them in preparing a tender. But I have no hesitation in saying that the time he assumed as a basis for his calculations would not correspond with what is now required. For all kinds of handwork more hours are indispensable than formerly. If the "Constants" were now in use they would have to be altered every year.

Now, this is a subject which does not concern us alone. The builder is in reality no more than an agent for the public, and whatever affects him must operate also on those who employ him. Strange to say, this undoubted fact is not realized. The public would seem to be indifferent when there are contests between workmen and builders. They appear to consider that the disagreeable affair is entirely circumscribed to the parties who encounter one another. For instance, is there a member among all those I have the privilege of addressing who can recall one case where he was told that he might proceed with deliberation in the erection of a building? The rule, as we all know, is to insist on the utmost expedition. We are bound under penalties not to go beyond a determined day.

Now, if buildings have to be erected as hitherto—i. e., without loss of time—is it not plain that with shorter hours and a diminution of the quantity of work produced in each of those hours, it will be necessary to employ far more hands, for which building owners will have to pay? By all means let the public become philanthropists. We are quite willing to keep works open for only a few hours every day, and to employ such a number of men that labour will need no exertion. But in that case they must not grumble at the amount of our tenders, nor go about bewailing the degeneration of builders.

There are, perhaps, very few of the public who are not more or less responsible for the condition of affairs which is supposed to make a reform of the building trade a necessity. They may not argue like the French official, the representative of the Minister of Public Works, to whom I referred at beginning. He would lead the public to imagine that it is possible for a workman, under a proper system of administration, to change places with an architect, engineer, or contractor. But by tolerating experiments like those of the London County Council, by encouraging dealers in cotton and soft goods, pins and needles, to go in for masonry, ironwork and sanitation, and by their unconcern during strikes and trade disputes they are helping to make workmen discontented. For my part, I believe that the worst sort of grievances to endure are those which are vague, and I am sure building workmen at the present time would suffer less if they defined what they want, and endeavored to discover how it could be realized.

As regards our trade, I suppose there never was a time when there were better facilities and more competence for executing work than there are at present. I am an advocate of the promotion of technical education, but I must say that I still believe the best school for young builders is to be found in builders' workshops. No branch among all the industries of England has been put to severer tests than ours. Styles of architecture change, and whatever is in fashion we are able to realize it with all the spirit of our predecessors. Greek, Gothic, Roman or Dutch buildings are alike to us. New requirements demand novel arrangements of construction, which are carried out as if they were an every day affair with us. In that way the history of any great building works become a sort of key to the industrialism as well as the taste of the age.

The public may not be able to appreciate all that we do at a right value. They cannot tell how much it costs to organize a system which will answer promptly and accurately every sort of demand that can be made upon it. But it is evident that at least one school of architects is able to realize how an ordinary builders' workshop can become an auxiliary to the architects office or the school of art. Some of you, gentlemen, may have seen the remarkable collection of essays entitled "Architecture: A Profession or an Art?" In the pages we find many things which reveal an altered recognition of the builder's importance. Thus it is stated "The contractor, the purveyor of labour, is not so far removed from actual building work as we architects, for he has, at all events, to know the nature and quality of materials, and he has generally passed through the workshop and learnt one or more trades, and made himself a handicraftsman. It would be an excellent thing if everyone who aspired to be an architect did the same, and learnt to do work with his hands as well as with his head." The example of the late Sir Gilbert Scott (a name that can never be mentioned by a builder, and especially myself, without reverence) might be cited as suggesting the value of some experience in a builder's workshop. When he had completed his articles in a London architect's office, he went direct to the offices of Messrs. Peto & Grisswell, to whom he gave his services in return for having the run of their workshop and their London works. There he acquired that knowledge which was of such advantage to him during a career which was marked by masterpieces.

Dredging under ice with a steam shovel was a contractor's trick in excavating for some stone piers at Winnipeg, Man. The Red river at this point is 468 feet wide. The work was begun in February, according to the *Railway Age*, the shovel used being a very powerful machine manufactured by the Vulcan Iron Works Company, of Toledo, O. The work was done by W. G. Reid, a Montreal contractor of large experience in bridge work. An ordinary track was first laid to within about 30 feet of a hole (22 x 60 feet) cut in the ice, which was about 2½ feet thick, over the proposed location of the first pier, from which point heavier ties, 8"x8"x10', laid 2 feet apart, were used. At the immediate edge of the hole were placed three long ties 10 inches in diameter and 50 feet long, and over this track the shovel was worked to within 6 inches of the edge of the hole, where it was securely anchored with blocks and chains. After a distance of about 10 feet in length along the full width of the hole had been excavated, a bent 8x8 feet and 13 feet 6 inches in height made of 10-inch timbers was sunk to the level of the ice, and cross-timbers 50 feet in length laid down, thus distributing the weight equally upon the ice and the bent. This method was continued until the whole excavation necessary for each pier was completed. The material excavated was discharged from the bucket upon sleds and hauled away.

\* From the inaugural address at the meeting of the National Association of Master Builders of Great Britain, by Mr. Robert Dennett, President.





BANK OF HAMILTON, WINGHAM, ONT.

D. B. DICK, ARCHITECT, TORONTO.





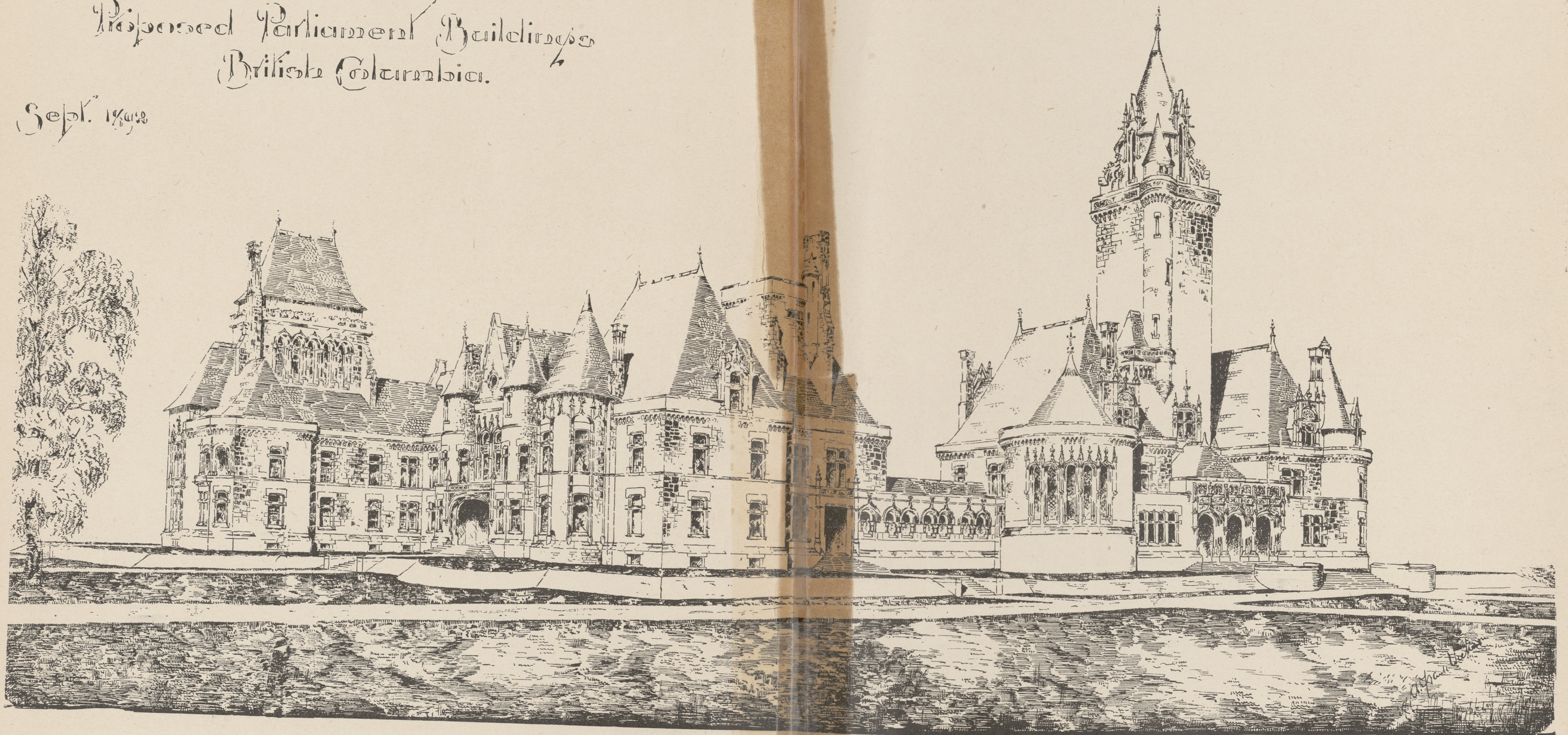
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Dr. Charles G. ...



Proposed Parliament Buildings  
British Columbia.

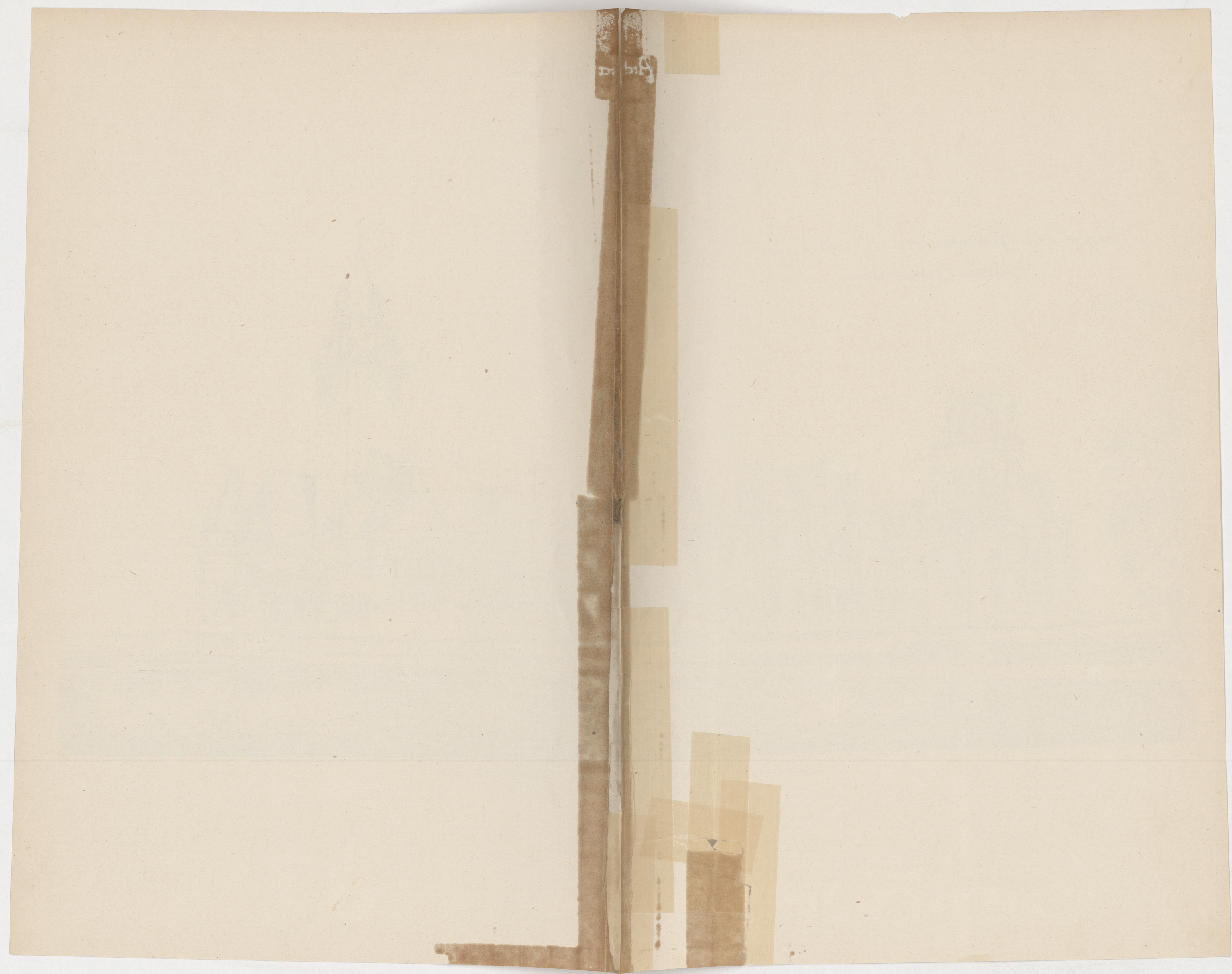
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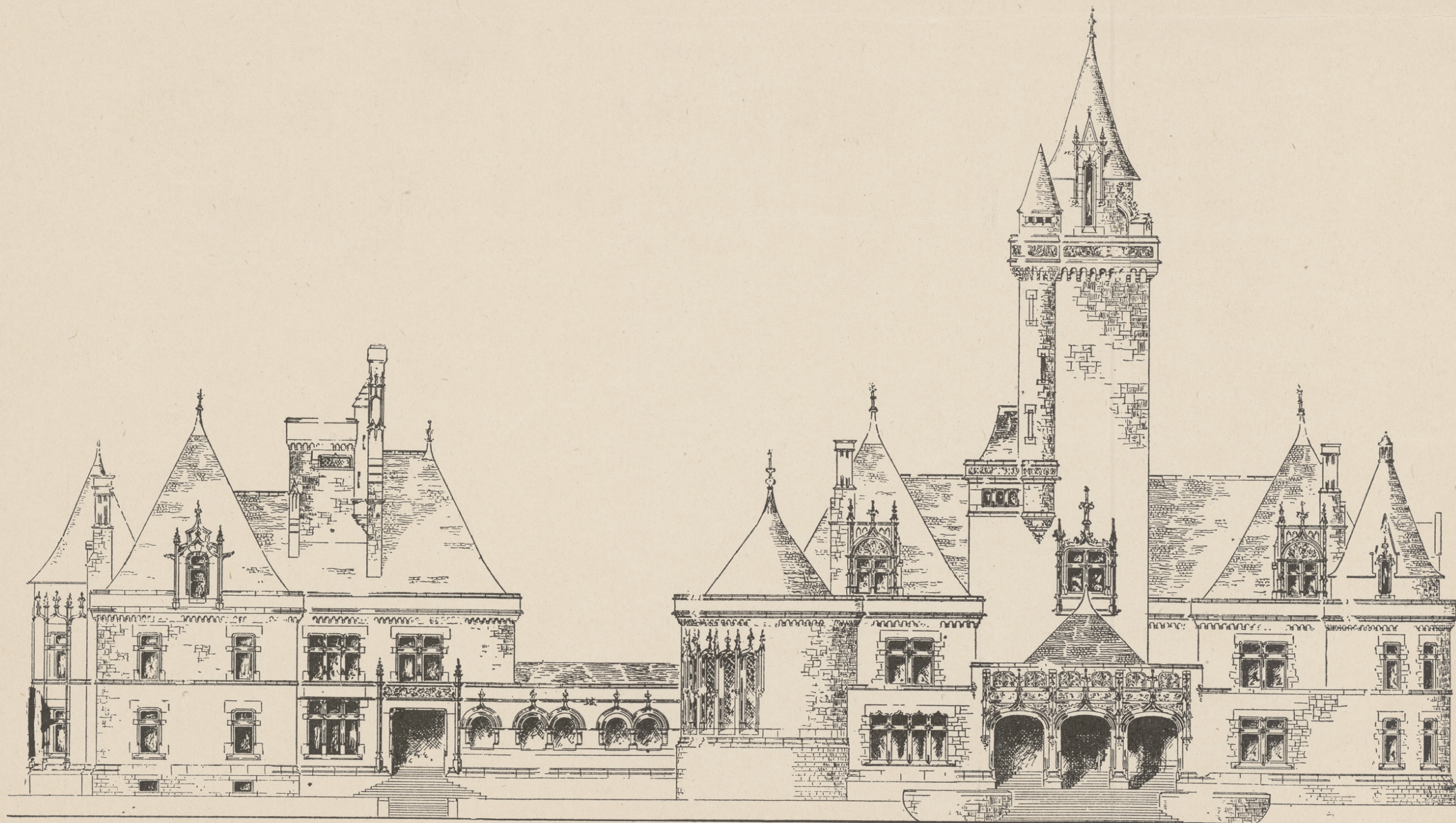
COMPETITIVE DESIGN FOR PROPOSED NEW GOVERNMENT BUILDINGS, VICTORIA, B. C.

MESSRS. DICK & WICKSON, ARCHITECTS, TORONTO.









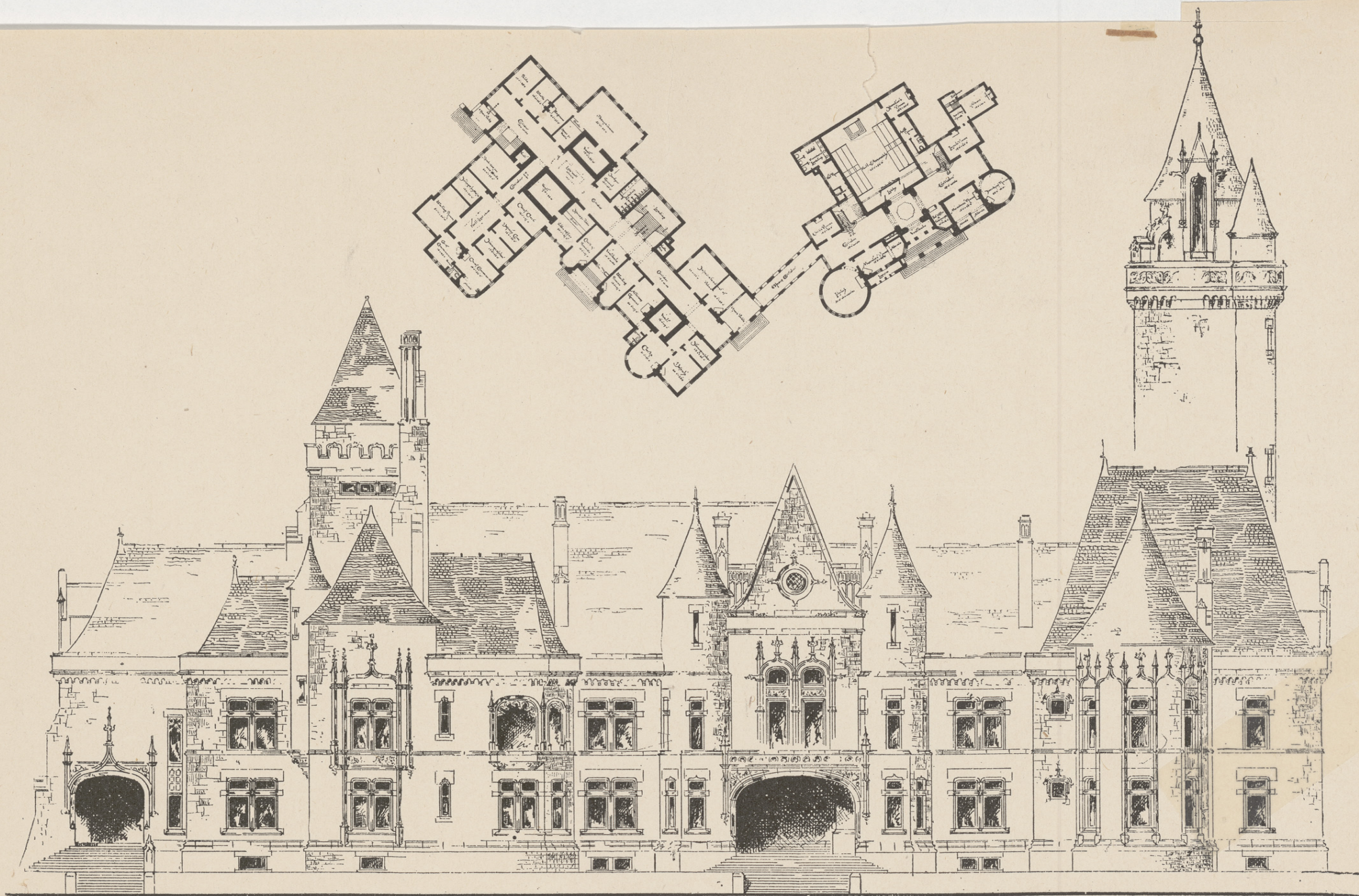
COMPETITIVE DESIGN FOR PROPOSED NEW GOVERNMENT BUILDINGS, VICTORIA, B. C.

LEGISLATIVE ASSEMBLY BUILDING - FRONT ELEVATION.









COMPETITIVE DESIGN FOR PROPOSED NEW GOVERNMENT BUILDINGS, VICTORIA, B. C.

ADMINISTRATIVE BUILDING—FRONT ELEVATION.







## CORRESPONDENCE.

[Letters are invited for this department on subjects related to the building interests. To secure insertion, all communications must be accompanied by the name and address of the author, not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

## THE PLUMBER'S PROFITS.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—While coinciding with the remarks appearing in your June issue anent the necessity of the plumber satisfying himself that his client is not made to pay for time which has been loitered away by journeymen and apprentices, I wish to call attention to the fact that the plumber's profits are by no means what they are frequently pictured to be. Competition is not less keen in the plumbing business than in other branches of the building trades, nor have the effects of this competition been less in the direction of reducing profits. There is this difference, however, as compared with some of the other trades, that plumbing material is of a very expensive character, and the plumbing work is expensive in consequence. A glance over the list of plumbers in Toronto to-day fails to show more than one or two who have succeeded in accumulating even a competency out of the profits of their business. This fact should in itself suffice to refute the charge that the plumber asks or receives exorbitant prices for his work. I hesitate not to say that there is probably no class of business men in the community who get smaller returns from their business than do the plumbers.

Yours truly,

JUSTICE.

## ONTARIO ASSOCIATION OF ARCHITECTS.

THE supplemental examinations for 1893 will be held on September 27th and 28th.

\* \* \*

The Association library has received from the Architectural Club a gift of Lübkes History of Art. The Architectural Club, in winding up its affairs, found a surplus on hand, which it expended in this way.



## A CRITICISM.

THE *British Architect* prints the following criticism of the illustration of a carved stone mantel which appeared in a recent number of this journal: In the CANADIAN ARCHITECT for May there appears an illustration of a carved stone mantel for a private residence in Toronto, which shows a grotesque face looking out from the centre of a mass of foliage ornament. The face, which has strongly marked features, is on the broad grin, of that type associated with the goblins of the nightmares of one's childhood. The head is covered with a flowing mass of rough tangled locks, and round the neck is a sort of collar, from each side of which stretch out the goblin's wings. We cannot say we appreciate this kind of thing inside the home, though it may be all very well in gurgoyles outside the building. As it is shown in this mantelpiece it is, however, decidedly out of place as an ornamental feature, and we can well imagine the time when to a sensitive child such an apparition would call up all sorts of horrible imaginings. But perhaps the lady for whom it has been executed, married though she be, has no children, or, if she has, expects them to be quite as strong-minded as herself in respect to grinning grotesques and hobgoblins.

## CONTRAST OF COLORS IN NATURE.

NATURE is very sparing of showy contrasts of warm and cold colours, says Mr. W. Barnes in a recent issue of the *Architect*. Red and blue are very rare, and of yellow and blue the cases are but few, and black and blue are found in lepidoptera more often than white and blue are seen in our flora or fauna. It is not uncommon for one of two strong colors to be overcast with a tinge of its fellow, or for both of them to be reconciled by a common touch of black or of some third colour, or for one of them to be lightened by a dash of white, while the other is lowered by as much black; and so red off-hued with black—russet and green upbrightened with white—often meet in the autumn in dead and dying patches of fading leaves. It may be shown, I believe, by the refractions of light in crystallised gypsum that brown is the complementary colour to lavender-grey; and how true to herself is Nature, we may go forth and see in the fall of the year; in the dead and curled leaves of the mugwort, or meadow sweet; which are beautiful even in their death, with one side brown and the other the brown-matching grey; and if brambles be cut in the leaf-green season, their two surfaces soon wither into the harmony of grey and brown. And what use are we to make of these hues of nature? They are warrants for a grey mantle under locks of brown hair, or a brown bonnet or trimmings, or a grey room wall with brown furniture; and if on a hot summer's day, I see the dark leaf shades playing on the grey bark of a young beech, I can boldly lay darkish leaf shades on a wall of the beech bark's hue; or if, after the winter

rains, I find a barkless pole in railings, tinted with the palest blue-grey, and on breaking off a splinter of it I find its inner wood of its true colour of pale brown yellow, why should I not take the inner tint for my wall and the outer one for the skirting? Or, if I pick up a piece of lichen of dull green on one side and dull grey on the other, why should I not bind my book in one colour and lay on it a lettering piece of the other? Nature is the best school of art, and of schools of art among men, those are the best that are Nature's best interpreters.

## THE CANADIAN CONTRACTOR'S HAND-BOOK.

THE second edition of this book which has recently left the press, has already had quite an extensive sale. We append a few opinions of the book as expressed by some of the leading papers:—

The *Monetary Times*: This is a compendium of useful information for persons engaged in works of construction, containing upwards of 150 pages. That it has been found of service is proved by the fact that the present is the second edition. First, and appropriately, appears the text of the Mechanics' Lien Act of 1877, and that of 1890 for simplifying procedure; also the consolidated Act respecting workmen's compensation, and Toronto and Montreal building by-laws. Next a glossary of terms used in building, notes on estimating—which seem to us very practical and valuable—and various tables having relation to the strength of materials and the weight of substances. A feature which to employers is worth the whole price of the book is the table giving the amount of a workman's wages for any number of hours, from 2 to 120, at rates per hour ranging from 15 cents to 45 cents. Then there are "Hints" for painters and paperhangers, "Points" for plumbers, &c., &c. Send to Charles H. Mortimer, publisher, Confederation Life Building, Toronto, for a copy, price \$1.50; to subscribers of the CANADIAN ARCHITECT AND BUILDER, \$1.

The *Toronto Mail*: "The Canadian Contractor's Hand-Book," by Chas. H. Mortimer (Toronto: Canadian Architect and Builder Press). This little book, which is a compendium of useful information for persons engaged on works of construction, is not to be estimated by its size, its value being greater than the number of cubic inches it occupies. In the pocket of the builder, the bricksetter, the stonemason, the joiner, and many other persons it will be found frequently useful. Besides a copy of the Mechanics' Lien Act, the Compensation to Workmen Act, and various by-laws relating to the building trade, it contains numerous useful tables and receipts, all of which have been carefully selected, and are applicable to daily use.

## PUBLICATIONS.

We have been favored by the Secretary with a copy of the calendar of the Architectural Association, of London. It comprises 200 pages of useful data relating to the Association, including the constitution and by-laws, form of application for membership, syllabus of meetings, curriculum, reports, list of members, etc.

We extend our congratulations to our esteemed Antipodean contemporary, the *Australasian Builder and Contractors' News*, which has lately celebrated its sixth anniversary. It is one of the most interesting of the many architectural journals which come regularly to our table, and is deserving of the largest measure of encouragement and support from those in behalf of whose interests it speaks.

We are informed that the Toronto Radiator Mfg. Co. have now in the printer's hands a catalogue which gives promise of being the most elaborate and expensive production in this line that has been executed in Toronto for a number of years. The volume is to contain some 200 steel plate views of Canada's best buildings, in addition to the usual illustrations of the Safford patent radiators and a carefully prepared treatise on Hot Water and Steam Heating.

The July *Cosmopolitan* will mark the most radical step ever taken in periodical literature. With that issue the magazine, unchanged in form, in fact, one of the best numbers of the *Cosmopolitan* ever issued, will be put on sale at twelve and one-half cents per copy—\$1.50 a year. The cutting in half of a price already deemed low for an illustrated magazine is the result of an intention long since formed, to give to the public an illustrated monthly of the very highest class at such a price as must bring it within the reach of all persons of intellectual tastes, however limited their income.

## PERSONAL.

Peter Belanger, contractor, Ottawa, is dead.

B. Mooney & Sons, builders, St. John, N. B., have dissolved.

The death is announced of Mr. Edward McCoskrie, architect, Victoria, B. C.

Mr. W. H. Carrick, manager of the Gurney Foundry Co., Toronto, is visiting the World's Fair.

We regret to learn of the accidental death of Mr. N. D. McDonald, a well known plumber of Winnipeg. While getting off an electric street car he was struck by a passing bicycle, receiving injuries which shortly after caused his death. Among some of the important contracts carried out by Mr. McDonald was the plumbing in the Hotel Leland, the Manitoba College, the Grain Exchange and the Barracks.

## RUSKIN ON BRICKMAKING.

OUR fields of good clay were never given to us to be made into oblong morsels of one size. They were given us that we might play with them, that men who could not handle a chisel might knead out some expression of human thought. In the architecture of the clay districts of Italy, every possible adaptation of the material is found exemplified, from the coarsest and most brittle brick used in the mass of structure, to brick for arches and plinths cast in the most perfect curves, and of almost every size, strength, and hardness; and moulded brick wrought into flower work, and tracery as fine as raised patterns upon china. And just as many of the finest works of the Italian sculptors were executed in porcelain, many of the best thoughts of their architects were expressed in brick, or in the softer material of terra cotta; and if this were so in Italy, where there is not one city from whose towers we may not descry the blue outlines of the Alps or Apennines, everlasting quarries of granite and marble, how much more ought it to be so among the fields of England?

Jean Marie and Louis T. Aubin have been registered partners to carry on business as builders at Montreal under the style of Aubin & Frere.



## SANITATION HEALTH

### ASSOCIATION OF EXECUTIVE HEALTH OFFICERS.

THE eighth annual meeting of the above Association was held at the city of Guelph, Ont., on the 27th and 28th of June. The proceedings were presided over by the President, Mr. Willis Chipman, C. E.

An address of welcome was presented by the mayor, and by the Local Board of Health.

Four sessions were held, one of which took the form of a public meeting, to which the citizens were invited.

Among the papers presented and discussed were the following:—"Diphtheria Epidemics and how Principally Propagated," by C. A. Hodgetts, M. D., Toronto; "Notes on the Prevention of Disease," by A. Groves, M. D., Fergus; "Toronto Water Supply," by J. J. Cassidy, M. D., Chairman Provincial Board of Health, Toronto; "Defences of the Province against Cholera," by J. Coventry, M. D., Medical Health Officer, Windsor; "Our Schools in Relation to Health," by Prof. J. Mills, M. A., President Agricultural College, Guelph; "The Danger of a Smallpox Epidemic," by P. H. Bryce, M. A., M. D., Secretary Provincial Board of Health, Toronto; "Systems of Sewerage available for Ontario Towns and Villages," by Alan Macdougall, C. E., Toronto; "Public Abattoirs, their Necessity and Benefits," by J. Wallace, M. D., Alma.

The following are the officers elect for the ensuing year:—President, Dr. Cameron, Owen Sound; First Vice-president, Alan Macdougall, C. E., Toronto; Second Vice-president, Dr. Howitt, Guelph; Secretary-treasurer, Dr. P. H. Bryce, Toronto; Executive Committee, Dr. Hall, Chatham; Dr. Coventry, Windsor; Dr. Sheard, Toronto; Dr. Griffin, Brantford; Dr. McCrimmon, Palermo.

### NEW PLUMBING BY-LAW OF THE CITY OF MONTREAL.

FOLLOWING is the text of an ordinance which is about to be adopted in the city of Montreal for the regulation of plumbing. This ordinance has been revised by and received the approval of the Montreal Sanitary Association. We are assured that the ordinance will probably pass the Council without material amendment:

Sec. 1. All plumbing and house drainage in the city shall be made and constructed in accordance with the following rules, which shall be binding on all parties concerned:

(1)—No drain or plumbing work shall hereafter be made unless plans, drawings and a description of the same shall have been previously deposited by the proprietor, or his representative, in the health office, at least eight days before the commencement of the work, and unless such plans and drawings shall have been approved of by the authorized officer; and in case of repairs or alterations affected by sanitary regulations, notice shall be given to the health department within 24 hours;

(2)—No part of the work shall be covered or concealed in any way until after it has been examined and approved of by the inspector; and notice shall be given to the health department when the work is sufficiently advanced for such inspection;

(3)—The water department shall refuse to turn on the water unless the demand for the same is accompanied by a certificate of the inspector, to the effect that the work has been inspected, and found to be in accordance with said rules;

(4)—The material used shall be of good quality and free from defects, and the work shall be executed in a thorough and workmanlike manner;

(5)—The arrangement of the soil, waste and ventilation pipes shall be as direct as possible;

(6)—The soil, drain, waste and ventilation pipes shall, if practicable, be at all times exposed to view ready for inspection and for convenience in repairing;

(7)—When necessarily placed within partitions or recesses of walls, soil, drain, waste or ventilation pipes shall be covered with woodwork so fastened with hinges, or round headed screws, as to be readily uncovered;

(8)—Every house or building shall be separately and independently connected with the street sewer, in front of such house or building, or with such other sewer as shall be designated by the board of health;

(9)—Every house drain shall be of iron, with a fall of at least  $\frac{1}{4}$  inch to the foot, and no joint shall be made directly under the wall of the house; moreover, where water-closets discharge into it, it shall be at least 4 and not more than 6 inches in diameter, and be laid in a straight line if possible. All changes in direction shall be laid with curved pipes and all connections with Y branch pipes and curved bends;

(10)—Every such drain put in and covered without due notice to the health department shall be uncovered for inspection within 24 hours, if required by the inspector;

(11)—No brick, sheet metal, earthenware or chimney flue shall be used as a sewer ventilator, or to ventilate any trap, drain, soil or waste pipe;

(12)—Soil pipes shall be of cast iron of the weight specified in subsection 20, and shall extend at least two feet above the highest part of the roof or coping, light, shaft louvres, window or other opening; they shall be of the same size throughout, and

in no case shall they be less than four inches in diameter; no cap or cowl shall be affixed to the same;

(13)—Soil, waste and vent pipes in an extension, shall be carried above the roof of the main building when they are closer than twenty feet to the windows of the main building or adjoining houses;

(14)—The vent-pipe from the horn of a water-closet shall be required only when the closet is at a distance of fifteen feet from the main ventilation pipe of the drain;

(15)—Rain-water leaders shall not be connected with sewers unless by special permission of the board of health;

(16)—Joints of sewers and soil pipes shall be gas and water tight;

(17)—When no water-closet exists, ventilated in accordance with the rules aforesaid, the main waste pipes shall be of lead or iron of the weight specified in subsection 20, and shall be not less than 2 inches in diameter unless there are more than four sinks, in which case the size shall be 3 inches in diameter; and every such pipe shall be continued full size through the roof in the manner prescribed for soil pipes;

(18)—When lead pipes are used to connect fixtures with vertical soil or waste pipes, or to connect traps with vertical vent pipes, they shall not be lighter than six lbs. sheet lead to the foot;

(19)—There shall be no traps in connection with vertical soil or waste pipes, unless by special permission of the board of health;

(20)—All pipes shall be sound and free from holes or cracks;

(21)—The following weight per lineal foot shall be accepted as standard:

#### IRON PIPES.

##### *For Plumbing work.*

2 inch	4 pounds	per lineal foot.
3 "	5 "	" " "
4 "	9 "	" " "
5 "	12 "	" " "
9 "	15 "	" " "

##### *For drain work.*

4 inch	12½ pounds	per lineal foot.
5 "	16 "	" " "
6 "	20 "	" " "

#### LEAD PIPES.

##### *For waste sink pipes.*

2 inch	10 pounds	per lineal yard.
4 "	15 "	" " "

Lead waste pipes, bends or cesspools shall be equal to not less than 6 lbs. per square foot of sheet lead;

(22)—The fittings used in connection with such pipes shall correspond with them in weight and quality;

(23)—No tar-coated cast iron pipes shall be used;

(24)—The plumbing work shall be tested by the Inspector in the presence of the plumber, (when the latter is required to be present) with the peppermint, smoke, water or any other test approved by the board of health;

(25)—When defective pipes are discovered, they shall be removed and replaced by sound pipes; defective joints shall be made tight and every part of the work in which defects are found shall be made to conform to the present rules;

(26)—Joints in iron drain, soil and waste pipes, shall be so filled with oakum and lead and hand caulked so as to make them gas tight, and they shall not be painted, varnished, tarred or puttied over until after inspection, unless the inspector does not signify his approval or disapproval of the work within 36 hours after the health department shall have been notified that the work is ready for inspection; the said joints may also be screwed joints; should the work prove to be satisfactorily executed in the judgment of the inspector, he shall grant a certificate to that effect to the person concerned;

(27)—All connections of lead with iron pipes shall be made with a brass or copper sleeve or ferrule of the same size as lead pipe, put in the hub of the branch of the iron pipe and caulked with lead; and the lead pipe shall be attached to the ferrule by a wiped or overcast joint;

(28)—All connections of lead pipes, shall, where practicable, be by wiped joints;

(29)—No tile pipe shall be connected with the soil or waste pipe unless the same be provided with a flange to admit of a proper connection being made;

(30)—Every water-closet, urinal, sink, basin, wash tray, bath, and every tub shall be separately and effectively trapped. This rule shall apply to a set of tubs, but only one trap shall be required for the set;

(31)—The connections between iron and tile pipes shall be made with the best Portland or Roman cement, or by such other mode as may be approved of by the board;

(32)—Traps shall be placed as near the fixtures as practicable, and in no case shall they be distant more than two feet from the fixtures;

(33)—There shall be only one trap under the water-closet and that immediately beneath the same;

(34)—All waste pipe fixtures other than water-closets, shall be provided at the inlet of such fixtures with strong metallic



strainers to exclude from such waste pipes all substances likely to obstruct them ;

(35)—In no case shall the waste pipe from a bath, tub or other fixture be connected with a water-closet trap ;

(36)—Overflow pipes from fixtures shall in every case be connected within the inlet side of the trap, and above the water ;

(37)—Drip or overflow pipes from the safety pan under water-closets and other fixtures, or from tanks other than those of water-closets or refrigerators, shall be made to run into some place in open sight ; and in no case shall any pipe be connected directly with the drain, waste or soil pipe ;

(38)—Water-closets apartments shall open to the outer air, or be ventilated by means of a window, shaft or air duct, or by a vent shaft to the chimney ;

(39)—Interior water-closets shall in no case be supplied directly from the city reservoir supply pipes ;

(40)—In tenement houses containing more than one family, there shall be one water-closet for each family and a separate cistern for each closet ; in other houses, however, a group of closets may be supplied from one tank ; but not water-closets on different floors ;

(41)—The overflow pipes from water-closet cisterns shall discharge into an open sink, or the basin of the water-closet, or where its discharge will attract attention and indicate whether waste of water is occurring into the soil or waste pipe or into the drain ;

(42)—Valves must be so fitted and adjusted as to prevent wasting of water ;

(43)—No privy vault or cesspool for sewerage shall be permitted in any part of the city where water closets can be connected with a public sewer in the street ; when no sewer exists in the street a permit for a temporary privy may be granted by the board of health ; and in such case it shall be water tight, of a capacity of 45 cubic feet ; the sides and bottom shall be constructed of cemented brick twelve inches in thickness and well cemented inside ; such vault may be constructed of cast iron, the shape or form of which shall be either circular or oblong without angles, and with a concave bottom ; it shall be provided with a ventilation pipe at least 4 inches in diameter, extending from the pit through the roof, sufficiently high as to prevent inconvenience to occupants of neighboring houses ; the seats shall have a tight fitting cover ; it shall have an aperture opening exteriorly to allow of cleaning by pneumatic process, such aperture to be 2 feet by 1½ feet in size ; or else the flooring shall be air tight and shall have a tightly fitting trap door communicating with the pit ; the top of the vault shall be one foot above the level of the ground ; nothing shall be put into such pit, excepting human excreta ; privies shall be located at a distance of 20 feet (or more according as the board of health may deem necessary) from any house or street ; they shall be emptied when the contents reach to within eighteen inches of the top of the vault or when judged necessary by the board of health, by persons appointed by the board ; no offensive smell or gases shall be allowed to escape therefrom. But, in no case shall a privy be allowed within the walls of a dwelling house ;

(44)—No steam exhaust, blow off pipe shall connect with a sewer or any house drain, soil pipe or waste pipe ; such pipe must discharge into a tank or condenser ;

(45)—Cellars shall not be connected with the house drain unless necessary, and by special permission of the board of health, and according to plans approved of by the board ;

(46)—A sub soil drain shall be provided when necessary, and shall be constructed and trapped to the satisfaction of the board of health ;

(47)—No trap shall be permitted between the house drain and the public sewer, unless by permission of the board of health ; conditionally however that such trap shall have a handle-hole for cleaning purposes and a fresh-air inlet pipe the whole as may be decided upon by the board of health ;

(48)—Drains in yards shall, in all cases, be trapped below frost, that is to say : four feet at least under ground ;

(49)—In the case of privy vaults now drained into a common sewer, they shall be isolated by means of suitable traps placed below frost and according to instructions from the board of health ;

(50)—In the case of a new house being built or one already existing being prepared, wherever there is a public sewer in the street, a water-closet shall be put in, to the exclusion of privy pits ;

(51)—The inspection of drains as well as the inspector of drains shall be under the exclusive control of the board of health ;

Sec. 2. The word "board," wherever it occurs in this by-law means the board of health of the city of Montreal ; and the word "inspector" means the inspector appointed by the said board to carry out the provisions of this by-law ;

Sec. 3. Any person contravening any of the provisions of the present by-law shall be liable to a fine, and in default of immediate payment of the said fine, and costs, to an imprisonment, the amount of said fine and the term of said imprisonment to be determined by the Recorder's Court, at its discretion ; but the said fine shall not exceed forty dollars, and the term of imprisonment shall not exceed two calendar months ; the said imprisonment however to cease at any time before the expiration of the period fixed upon by the Recorder's Court, on payment of said fine and costs and where the infraction is continuous, such infraction during each day, shall constitute a separate offence.

## COMBINATION HEATING.\*

THE word "combination" may be defined as the result of combining or joining together two or more different elements or systems into one harmonious whole. There are several distinct and different systems of heating, and the combining of any two of these systems into one would naturally result in a combination system. The specific form of combination heating which I wish to treat of is obtained by a combination of steam or hot water and air, or, as it is commonly called, furnace heat. The advantage of the combination system in buildings suitable to its use are manifold, but in order that these advantages may be made apparent, it may be necessary to diverge a little. Heat is supposed by many to be an actual and discernible substance, and until within a very few years even the more advanced students of natural physics were of the same opinion. Later investigation has shown that heat is nothing more or less than molecular motion, consisting in case of air of nearly uniform rectilinear motions, with sudden changes in direction and velocity when the molecules come too near one another ; in case of a liquid of irregular wandering of its molecules, and in case of a solid or orbital or oscillatory motions. By the foregoing definitions it will be readily seen that air will absorb heat much more rapidly than either liquids or solids, and as in combination heating we are depending for fully fifty per cent. of our heat on air heat, the natural conclusion is that a combination heater will give results in the rooms to be heated much quicker than either straight steam or straight hot water.

Heat is communicated from one body to another in three ways, viz. : Radiation, convection and conduction. Radiant heat passes from one body to another at a distance through the air in straight lines and with great velocity, but it does not, to any appreciable extent, warm the air through which it passes. Conducted heat passes from one particle of matter to another at insensible distances, as an iron bar with one end in the fire becomes gradually heated at the other end. Convected heat is the movement of the heated body itself from one point to another, as the circulation of hot air or hot water. In combination heating we again have an advantage over straight steam or hot water, as we utilize in the rooms to be heated two or three processes of heat distribution—i. e., radiant and convected heat—while in steam or hot water only the radiant heat is utilized.

One of the most important features of combination heating is the fact that where the air supply is taken from the outside, as it always should be, it ensures a perfect ventilation throughout the building, as well as heat. The necessity for ventilation is very little appreciated by the general public, but as heating and ventilation have always seemed to me to be inseparable, and as the people naturally turn to our profession for their knowledge of these matters, it might be well for me to ask, What is ventilation, and why is it necessary? Ventilation is the act of replacing foul, impure air, in a confined space, with pure air. Please note that word "replacing." Times without number have I had people assure me that they had looked out for the ventilation of their house, as they had fireplaces in all the principal rooms. When asked if they did not know that "Nature abhorred a vacuum," and that their fireplaces would not exhaust unless there was some means provided for replacing the air thus removed, would reply, "They had not thought about that, but guessed there would be enough leaks in the doors and windows anyway." I could cite any number of leading authorities and read whole chapters showing the necessities of ventilation and the vast consequences of the result of continued breathing of impure air, but a mere statement of the component elements of air will suffice for this article. If we divide air into 10,000 parts, its composition would be as follows : Oxygen 2,096, nitrogen 7,900 and carbonic acid 4 parts. When the proportion of carbonic acid in a room is increased from the normal amount of 4 parts in 10,000 to between 5 and 7 in 10,000, a faint, unpleasant odor is usually perceptible to one entering from the fresh air ; if the proportion reaches 8 per cent the room is said to be close. According to some authorities, a full-grown man at rest will exhale through the pores of the skin and from his lungs nearly ¾ cubic foot of carbonic acid per hour. Taking a room containing 2,500 cubic feet of air in its normal condition, we find that the air contains 1 cubic foot of carbonic acid. Now, let us suppose this room to be a sleeping room, not ventilated, occupied by two persons eight hours each night. If the windows and doors of the room were closed during the eight hours, the natural portion of carbonic acid would be increased to about 13 cubic feet (or 1 part to 200), and the occupants would arise in the morning with depressing headache. A person coming into the room from the outside would declare the air to be "foul," and a man does not need to be a crank on ventilation to reach the conclusion that such a situation would be anything but healthful. This condition could be obviated, to a certain extent, by raising the windows, but that practice is dangerous in results, is a prolific source of colds and sickness, and as a means of ventilation totally unreliable, not to mention the morning's discomfort of arising in a cold room. Accurate ventilation will replace the air in a given room every 20 or 30 minutes without draft.

I wish to call attention here to the reason why the combination heater will from natural causes give more perfect and greater results in ventilation than it is possible to obtain from indirect

\* Abstract of paper read by Mr. Geo. Hoffman before the National Association of Steam and Hot Water Fitters.



steam or hot water, more particularly hot water. The force which we use to crowd the fresh air into the room and drive the foul air out is due to the expansion of the fresh air by heat. Air expands one-four-hundred-and-ninety-first of its bulk for every degree it is heated above 32° F.

Thus it will be seen if we heat the air 55° warmer than the surrounding air we have increased its bulk very nearly one-tenth. The greater the difference in temperature the greater the expansion, and, as a natural consequence, the more rapid the movement of the warmer air. On a moderate winter day the indirect radiator in a hot water job is rarely heated over 130° to 140° F., and as it is not possible for the air in passing through the stack to absorb more than from one-half to two-thirds of the heat, the temperature of the air flowing into the room under such conditions will rarely exceed 75° to 80° F. As the force with which the air comes into the room depends upon the difference in temperature of the air in the stack and the air in the room, it will be readily seen that the movement must be very sluggish. With the combination heater, the air coming in contact with the fire and smoke surfaces only, the temperature is raised much higher, with the result of a rapid flow of a large volume of air into the room in question.

Now, one more point, then I am through. In installing a combination job great care should be taken to place the heater as near the centre of the work as possible, locating all air registers as near the heater as practicable, so as to insure short connecting pipes in the basement. Always locate registers away from windows or cold walls, selecting, if possible, the warmest side of the room. Cold and warm air are always antagonistic, and you should give the warm air all the advantage possible if you wish for the best results.

Lastly, the combination system of air and water heating particularly is in the market to stay, and to you who are interested in residence or school heating the subject is worthy of your most careful consideration.

#### USEFUL HINTS.

Fine bolted whiting is a good thing to add to graining color for oak when it is desired to thicken it without changing the shade. Melted beeswax, or soap dissolved in hot water, and added to the color while warm, may also be used.

According to a contemporary, sheet brass may be cut chemically with success by the following method: Make a strong solution of bichloride of mercury in alcohol; draw a line across the brass with a quill pen, where it is to be cut. Let it dry on, and with the same pen draw over this line with nitric acid. The brass can then be broken like glass cut with a diamond.

The art of producing mosaics is, according to an American contemporary, being extended to leather, the pieces being variously colored, some having metallic hues, others with a transparent glaze over another color. They are attached by glue to a hardwood ground, framed the depth of the pieces, which are shaped as required.

The formation of efflorescence takes place in the following manner: Bricks made from clay, having a high percentage of the sulphates of magnesia, soda or potash in their composition, and not sufficiently fired to fuse or amalgamate them with the silicates and oxides of iron, will readily dissolve the alkalis on becoming wet, and with the evaporation of the moisture a large quantity is carried to the surface and deposited in crystalline form.

**FIREPROOF MORTAR.**—Mortar for resisting the action of fire, and proper to be employed in building slight brick piers as substitutes for, or instead of employing, iron columns, may be made of pozzolano mixed with fresh-ground lime of chalk from the lower beds; and as real pozzolano is an imported substance and likely to be expensive, its place may be very well supplied by an artificial substance of similar character, produced by burning any marly clay that is fit for brickmaking to a gray clinker, and reducing such clinker to a grain of the size of gray sand. Three-fourths of this substance to one-fourth of fresh-ground lime, mixed dry in the first instance, and, when so mixed, rendered plastic by the addition of soft water, will yield a mortar capable of resisting fire for a long time, and water, if need be, as long as any bricks that can be set in it.

A plastered ceiling that is very loose and almost about to fall, may sometimes be saved by the following method: Form of two or three pieces of scantling, and ordinary laths, a frame long enough to cover the defective part. Hold this against the ceiling by means of two uprights and gently press back the loose plaster against the underside of the joists, supporting the lower portions of the uprights by means of wedges. Now take some ordinary wrought nails, and file slots into their heads so that they may be driven home by means of a screwdriver. Use a sharp screwdriver and press

each nail gently through the plaster into the joist, giving each a twist when it has entered the wood. If this is done carefully, the plaster will not be disturbed, but will be held perfectly when the framework is taken away. A little plaster of Paris, for filling up the holes will give a very good job. For safety the ceiling is best papered before being whitened.

**COAL-TAR FOR WATERPROOFING.**—The use of coal-tar for waterproofing masonry is recommended by a French technical journal. For surfaces exposed to the air it is advised to apply from one to three coats boiling hot. Its durability is increased by adding a small proportion of India-rubber dissolved in benzine. If the color of the coating is objectionable, it may be dusted with plaster-of-Paris before drying. Where surfaces are to be covered with earth a single coating of tar made thick by blazing is preferable. A small quantity, two or three gallons, is brought to a boiling temperature and lit at the surface. It is allowed to blaze and kept constantly stirred at the same time until the volume is considerably reduced and it becomes pasty on cooling. The product is spread as rapidly as possible with a large flat brush, which is dipped often to prevent cooling. A single coat applied in this manner adheres firmly to even the smoothest surface.—*Invention.*

A recent invention, says the American *Upholsterer*, intended to supersede the heavier wood ceilings, is a light and handsome wood veneer. This consists of a thin layer of natural wood on a background of paper, which is placed upon the ceiling in about the same way that ordinary wall is laid—only to attain perfect results it is first necessary to coat the surface to be employed with a thin layer of muslin. This ceiling when completed is, if anything, more artistic in appearance than those of heavy inlaid wood. The cost of treating a ceiling in this way is much less, and the great variety of woods and their easy attachment seems to give a wider latitude for beautiful effects. There is hardly any combination of color that cannot be formed out of the natural wood. The white bird's-eye maple, curly maple, white holly and pink bird's-eye maple form a combination that is beautiful in its light and chaste effect. The union of the laurel burl, figured walnut and amaranth is most taking in appearance. The dark, rich colours of these woods blend into perfect harmony.

## MANUFACTURES AND MATERIALS

Quite a demand for Canadian lumber is reported from St. Johns, Nfld., where large building operations are in progress.

The Consolidated Plate Glass Company of Canada, Limited, has been incorporated, with a capital stock of \$250,000.

Mr. E. B. Jarvis, architect, Toronto, has invented and patented a system of heating and ventilating. The Toronto Radiator Mfg. Co. will manufacture the apparatus.

The Paterson Manufacturing Company, with chief place of business at Toronto, is being incorporated with a capital stock of \$50,000, to manufacture building paper, roofing material, etc.

At one of St. George granite quarries the other day, says the *Sun*, a block was taken out 32 feet long, 18 feet wide and 15 feet thick. It is computed that this block of stone when loaded on a car will be worth \$5,000. It contains about 250 tons of stone.

The Company which is being organized in Victoria, B. C., to manufacture Portland cement expect to find a profitable market in China and Japan. The cement manufactured in those countries will not it is said stand for any length of time under water, and half a million dollars worth of English cement is imported annually.

We understand that the Toronto Radiator Mfg. Co. are preparing a very large shipment for Tientsin, North China, and that they export very largely to Great Britain, France and Germany. They also ship to the United States. In certain parts their goods are preferred to those manufactured there, and the consumers are satisfied to pay the additional 45% duty and use the goods manufactured in Canada, which speaks well for Canadian industry.

Messrs. W. R. Melville, E. P. Brimmer, W. H. Robertson and S. E. Manuel are the owners of 200 acres of land on Cortes and Rugged Islands, about 90 miles from Vancouver, B. C., which has been found to contain an unlimited supply of red granite of excellent quality. The quarry is situated on a good harbor, the depth of water making it possible for vessels of any tonnage to approach close to shore. The stone will shortly be placed on the market.

At a meeting of the Consolidated Plate Glass Co., of Canada, Limited, held at Toronto on the 4th inst., the following gentlemen were elected directors: Frank J. Phillips, William Ferguson, Edwin Hill, William G. Phillips and Joseph McCausland, of Toronto; William R. Hobbs and Thomas S. Hobbs, of London, Ont.; Alex. Ramsay and L. I. Boivin, of Montreal, and George Howe, of Ottawa. At a subsequent meeting of directors, Frank J. Phillips was elected president and William R. Hobbs and Alex. Ramsay, vice-presidents.

## CREDIT VALLEY BROWN STONE

From Carroll & Vick's No. 6 Quarry, Credit Forks, Ont.

SANDSTONE, fine grained, reddish brown. Contains quartz, and a little felspar and mica. The stone is in beds of four feet and under, and can be handled in pieces up to five tons. Quarry 300 yards from Railway.

Specimen.	Section under Pressure	Height.	Crushing Load.	Crushing Stress per sq. in.	Average Crushing Stress per Square Inch
	Ins.	Ins.	Pds.	Pds.	Pds.
A	.....	.....	.....	.....	.....
B	2 7/8 × 3	2 7/8	131,000	15,188	14,905
C	2 15/16 × 3	2 7/8	130,000	14,751	
D	3 × 3	2 7/8	133,000	14,777	

14,905 pounds is the average crushing strength per square inch of our Credit Valley Brown Stone.

The highest standard of test attained by any pure Sandstone in America.

IN confirmation of the facts above stated, we have pleasure in directing your attention to the accompanying table, showing the result of the test of our stone, in connection with the series of tests of building stones conducted in 1892 at the School of Practical Science, Toronto, under the direction of a committee of the Ontario Association of Architects.

By referring to the results of the tests above mentioned, it will be seen that the average crushing stress of the majority of Canadian and American sandstones is far below that of ours, the difference in our favor ranging from 75 to 50 per cent.

The Credit Valley Brown Stone, owing to its modest tone, harmonizes beautifully with red or cream colored brick.

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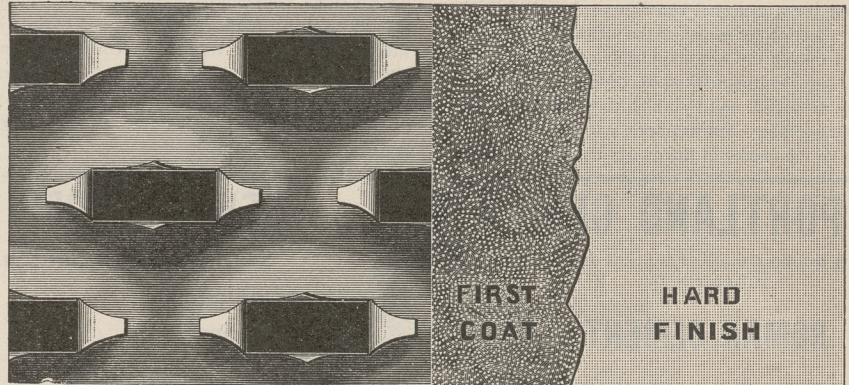
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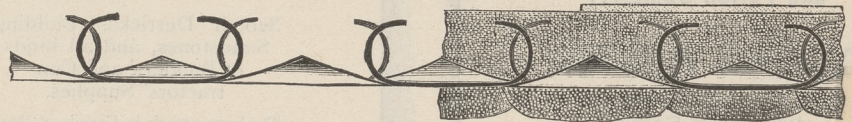
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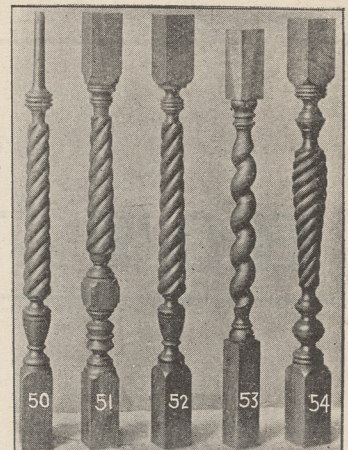
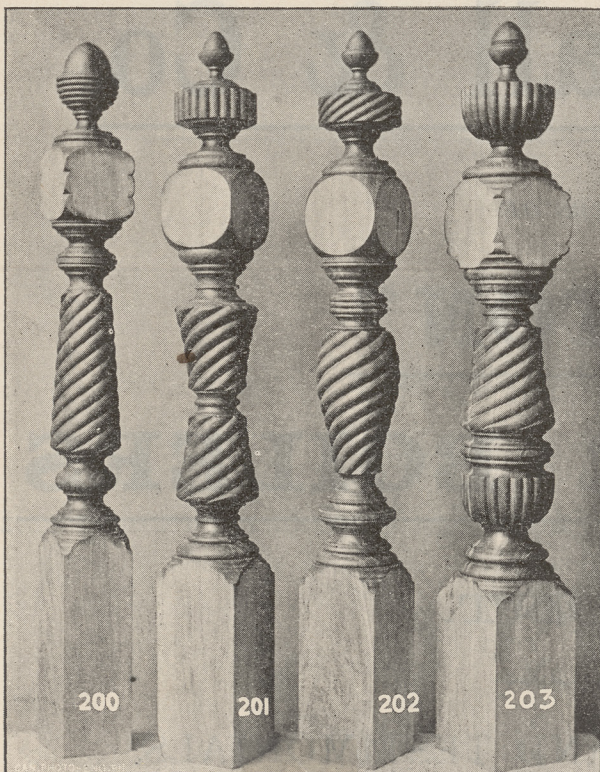
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**STONE UNDER THE MICROSCOPE.**

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or, since it decomposes with ease and stains and discolours the rock. Pyrites in sharp, well-defined crystals sometimes decomposes with great difficulty. If a crystal or grain of pyrites is embedded in soft, porous, light coloured sandstones, its presence will certainly soon demonstrate itself by the black spot which will form about it in the porous stone, and will permanently disfigure and mar its beauty. If the same grain of pyrites is situated in or near very hard, compact, non-absorbent stone, the constituent minerals of which are not rifted or cracked, this pyrites may decompose and the products be washed away, leaving the stone untarnished.

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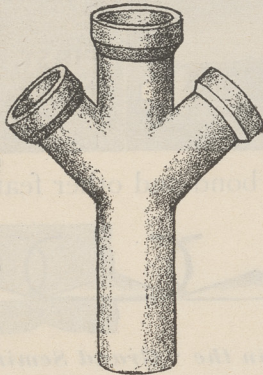
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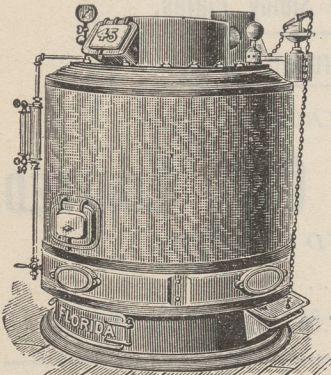
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